Policy Impact

The Effect of Selective Contracting on Hospital Costs and Revenues

Jack Zwanziger, Glenn A. Melnick, and Anil Bamezai

Objective. To examine the effects of selective contracting on California hospital costs and revenues over the 1983–1997 period.

Data Sources/Study Setting. Annual disclosure data and discharge data sets for 421 California general acute care hospitals from 1980 to 1997.

Analysis. Using measures of competition developed from patient-level discharge data, and financial and utilization measures from the disclosure data, we estimated a fixed effect multivariate regression model of hospital costs and revenues.

Findings. We found that hospitals in more competitive areas had a substantially lower rate of increase in both costs and revenues over this extended period of time. For-profit hospitals lowered their costs and revenues after selective contracting was initiated relative to the cost and revenue levels of not-for-profit hospitals. The Medicare PPS has also led high-cost hospitals to lower their costs.

Conclusions. The more competitive the hospital's market, the greater degree to which it has had to lower the rate of increase in costs. A similar pattern exists with regard to hospital revenues. Both of these trends appear to result from the growth of selective contracting. It remains unclear to what extent these cost reductions were the result of increased efficiency or of reduced quality. Since hospital cost growth is sensitive to the competitiveness of its market, antitrust enforcement is a critical element in any cost containment policy.

Key Words. Managed care, competition, California hospitals, hospital cost function

Policymakers have been concerned with growing health care costs since the 1970s, when such costs began to increase rapidly. Between 1970 and 1995 the share of health expenditures in the gross domestic product (GDP) rose from 7.1 percent to 13.6 percent (Levit, Lazenby, Braden, et al. 1996). To cut costs, many policymakers began to advocate for a health care system that would be market-based and responsive to competitive pressure. However, early studies on the effects of competition found that, contrary to what happens in most markets, increased competition in the hospital markets actually increased hospital costs. Yet more recent studies have shown the opposite pattern, with

hospital competition resulting in lower costs. These contradictory results are not attributed to differences in the analytical approaches used in studying costs and competition in the hospital sector; rather, they reflect structural changes in the way the U.S. health care system operates.

The most dramatic operational change in the health care system was the emergence of managed care organizations (MCOs). MCOs promised and, at least initially, succeeded in decreasing the growth rate of health insurance premiums by containing costs, improving system efficiency, and inducing competition among health care providers (Dranove, Shanley, and White 1993; Robinson and Luft 1988). Extensive evidence exists to demonstrate that MCOs have succeeded in reducing the growth of health care costs. These include studies of its effects on premiums, on hospital costs, and on other cost components.

Although some evidence suggests that these cost reductions will be maintained over time (Zwanziger et al. 1994a), it is still not clear that MCOs will be able to keep cost growth down over the long run. A study of the HMOs' costs found the costs to be lower—but also found that HMO rates of cost growth were the same as those of indemnity plans (Newhouse et al. 1985). One possible explanation for the observed decrease in health care cost growth is that it reflects a one-time gain, resulting from the costs that accompanied the rapid implementation of managed care systems, but that it does not reflect a change in the underlying growth rate.

Selective contracting is one of the structural changes that has altered the way in which the health care market operates. A central objective of selective contracting is to foster price competition among health care providers by encouraging the formation of Preferred Provider Organizations (PPOs), which are a type of MCO. PPOs are based on contractual arrangements between a panel of health care providers (physicians and hospitals) and a purchaser of health care services (insurers and self-insured employers). PPOs induce price competition by providing subscribers (potential patients) with financial incentives, such as decreased costs, to encourage the use of specific providers. These providers, in turn, negotiate in advance to offer discounts from charges

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or accept fixed payment rates, such as a per diem or per discharge rate. Providers who do not sign contracts with PPOs in their areas run the risk of losing a significant portion of the market. The ability to exclude high-cost providers, coupled with the introduction of price competition among health care providers for insurer contracts, may reduce a third party payer's expenditures. Selective contracting has been used both by Medicaid programs and by private third party payers such as Blue Cross and commercial insurance companies. (In addition to PPOs, selective contracting is carried out by some health maintenance organizations. HMOs exert a larger amount of control over costs by channeling subscribers into a closed provider panel.) By 1990, over 80 percent of the population in California was enrolled in an MCO.

After California passed selective contracting legislation in 1982, other states did the same as they enacted legislation to reduce the threat of antitrust prosecution for third-party payers that excluded providers from their participating provider group. The effect of such legislation has been the growth of widespread selective contracting. MCOs have grown spectacularly. By 1998 approximately 180 million Americans were enrolled in one or another form of managed care plan (American Association of Health Plans [AAHP] 1998). However, because California was a pioneer in managed care, and because the transition to managed care in that state has outpaced that of the rest of the nation, California is an ideal setting for the study of managed care effects and for predicting likely future national trends.

Before selective contracting and managed care were introduced, hospitals in more competitive areas tended to have higher costs (Farley 1985; Joskow 1980; Luft, Robinson, Garnick, et al. 1986; Robinson and Luft 1985, 1987; Wilson and Jadlow 1982; Robinson 1996). This was consistent with the prevalence of quality- and amenities-based competition during a period when physicians dominated health care markets. Subsequent to the introduction of selective contracting legislation, however, the difference in total hospital expenses and revenues between hospitals in high-competition markets and those in low-competition markets began to decline steadily (Zwanziger and Melnick 1988). Selective contracting also reduced the rate of inflation on average costs per admission and per day (Robinson and Phibbs 1989). In general, cost growth rates were reduced significantly (Robinson 1991; Zwanziger et al. 1994b; Melnick and Zwanziger 1995).

In addition, the emerging literature suggests that competition can lead to reduced costs for consumers if the customers, appropriately defined, are price sensitive (Zwanziger et al. 1994b). For insurers, selective contracting has resulted in lower prices (Melnick et al. 1992; Wholey, Feldman, and Christian-

son 1995; Feldstein and Wickizer 1995). HMO penetration has reduced the expenditures of fee-for-service Medicare enrollees through spillover effects (Baker 1997, 1999). Two studies also suggest that selective contracting is having similar effects at a national level (Bamezai et al. 1999; Gaskin and Hadley 1997).

Our article builds on these other studies and on our own earlier work (Zwanziger and Melnick 1988; Zwanziger, Melnick, and Bamezai 1994) by examining a longer time period, adding revenues as well as costs to the analysis, and studying the effects of Medicare, Medicaid, and competition jointly. Because California was one of the leaders in implementing selective contracting, we can analyze data over a 17-year period and determine the effects of this mechanism on the health care market to assess whether the initial decrease in costs has been sustained. We estimate multivariate models of hospital costs and revenues in this article to determine the effects on hospital costs and revenues of changes in the nature of competition. One particular focus here is on whether the effects of selective contracting constituted a one-time change or whether they have been sustained over an extended period of time.

DATA AND METHODS

Empirical Model Specification and Estimation

Empirical studies of hospital cost functions have tended to adopt one of two approaches in specifying the model to be estimated (Breyer 1987). One approach is ad hoc, with variables based on knowledge of the hospital industry; the other stems from the flexible functional forms used in the analysis of neoclassical production theory (McFadden 1978). More recently, an approach that combines both of these methodologies has become common (Granneman, Brown, and Pauly 1987; Zwanziger and Melnick 1988). This approach includes the logarithm of the multiple output and input price levels. It combines this with measures specific to the hospital industry to account for the heterogeneity in hospital outputs that are not captured by aggregate measures such as the number of discharges and visits. For this study, we used a hospital fixed-effects estimator of hospital costs and revenues with a model specification based on the translog structure because of the flexibility and theoretical appeal of the translog structure.

Because our objective was to study the effects of changes in policy and market environments of hospital costs and revenues, the model we estimated

characterized the hospital and its competitive environment over time. The model had the following form:

$$C_{it} = f(F, P, Z, M, B, T) + h_i + e_{it}, \tag{1}$$

where:

C = total hospital costs (or revenues);
F = a vector of hospital flow variables (e.g., inpatient discharges, outpatient visits, case mix, etc.);
P = the input price index;
Z = a vector of hospital control variables (e.g., ownership, teaching status, number of beds);
M = measures for competition in inpatient hospital markets;
B = measures that capture cost-cutting pressure from the Medicare PPS and Medicaid selective contracting programs;
T = a vector of time dummies;
h_i = a hospital-specific constant; and
e_{it} = the error that is i.i.d.$(0,s^2)$.

The translog function related total costs and revenues of hospital i in time t to a series of covariates that are described in the next section.

Data Sources

We used data from a variety of sources, but primarily from the California Office of Statewide Health Planning and Development (OSHPD). The California state government has required hospitals to report detailed cost, revenue, and utilization data, which provides an extraordinarily rich source of hospital data. Changes in prices of hospital inputs were obtained from price index data published by the Bureau of Labor Statistics (BLS) and the California Health Facilities Commission.

Hospitals reported to OSHPD on a quarterly basis making it possible to construct a longer time-series of hospital data than that based on the annual Disclosure Reports (which are audited more stringently but take longer to be released to the public). For the years in which both quarterly reports and the annual Disclosure Reports were available, we annualized the quarterly data and compared it to the corresponding information from the annual Disclosure Reports. The match was very good for the variables used in our analysis. As a result, we have used annualized quarterly data for all of the hospital flow variables.

Construction of the Dependent Variable and Covariates

Except in the case of the Medicare pressure index, covariate construction has closely followed the methodology laid out by Zwanziger and Melnick (1988). The Medicare pressure index was constructed somewhat differently than the pressure index used in the earlier study. The construction of each covariate is described in turn.

Dependent Variables. Total hospital expenses and revenues were taken directly from the quarterly reports. These dependent variables were not deflated because we did not want to restrict hospital response to increasing input prices to be exactly proportional to inflation. Instead, we included an input price index as a covariate to control for inflation. Since both of these variables were highly skewed, we used their logged form in the model.

Input Price Variables. We used the Medicare area wage index to control for the relative cost of labor in each hospital's geographic area.

Case Mix Index. The case mix index was based on the California discharge data set. The index was estimated using all payer discharge data and New York State all-payer DRG weights for the years 1983 through 1993. The 1993 weights were used to calculate all of the post-1993 indexes.

Medicare Pressure Index. The Medicare pressure index was intended to capture the pressure that hospitals have been facing to cut costs as the result of the Medicare prospective payment system (PPS). The pressure index for each hospital was constructed as the product of two ratios:

$$Pressure\ Index = (C_{84}/R_{84} - 1) * (D_M/D_T) \tag{2}$$

where:

C_{84} = average Medicare cost per discharge in 1984 standardized for case mix and teaching intensity;
R_{84} = the Medicare reimbursement per discharge in 1984 based on the national Medicare rate;
D_M = the number of Medicare discharges in 1984; and
D_T = the total of all discharges in 1984.

The pressure index was constructed to measure the degree to which the change in Medicare reimbursement to the PPS could affect the hospital's profitability. A high-pressure index means that hospital costs were high relative to the PPS reimbursement and that Medicare business was a substantial fraction of total business at the hospital. The pressure index we used ignored the initial phase-in of the national rate. Rather, it captures the full impact that hospitals

would have faced had the PPS national rate kicked in immediately (i.e., the program's full financial impact in the absence of change). The pressure index for a hospital was kept constant in magnitude over time, but was interacted with time in the cost models to allow for behavioral adjustments leading to changes in the effect of Medicare pressure on hospital costs over time.

Market Competition. We chose the Hirschman-Herfindahl index (HHI) as our basic measure of competition. A somewhat less standard, but equally important component of the competition measurement was the definition of the market in which a hospital competes. In many early studies of hospital competition, a hospital market was defined arbitrarily using either political boundaries (e.g., the county) or fixed distances (e.g., all hospitals within an X mile radius of a given point). Such definitions biased the estimated effect of competition on hospital behavior downward by introducing error in the measurement of competition. Hence, in our study, we collected patient origins data by zip code to determine the extent of each hospital's market.

Three steps were required to calculate each hospital's HHI. First, we defined service-specific market areas for each short-term general hospital in California. We developed categories for hospital services by combining all of the diagnosis-related groups (DRGs) that would be provided by the same type of physician (Zwanziger et al. 1994b). All of the discharges from a given hospital that fell within a single service category were combined and used to calculate service-specific market areas. Thus, this approach can correctly account for the fact that simple services (e.g., normal deliveries) are usually provided for only the local population, while complex tertiary care (e.g., neurosurgery) draws from a much wider area. Second, each hospital's competitors were identified and their share of the service-specific market was calculated. Third, each hospital's service-specific HHIs were derived from the market share values. Then the HHIs were averaged across services and zip code areas using discharge weights, resulting in an overall measure of the competitiveness for each hospital. The primary data sources for this task were the California Discharge Data Set for 1983 and 1994. (The descriptive statistics of the variables are summarized further on in Table 2.) For the years before 1983, we used the HHI for 1983. The HHI changes very slowly so we do not expect this to have an effect on the results.

RESULTS

Using these variables, we were able to examine cost and revenue patterns from 1980 to 1997. As Table 1 demonstrates, average operating revenues and

expenses have increased in tandem from 1982 to 1997. Most of the other variables have also remained remarkably stable over this 15-year period. However, the number of outpatient visits has shown rapid growth, and the proportion of hospitals with fewer than 100 beds has decreased significantly.

We also examined the rate of growth in expenses for a panel of hospitals operating in markets with different intensities of competition. These results, which are displayed in Table 2, show that consistent differences existed among hospitals with varied levels of competition. For example, during the period 1994–1997, those hospitals operating in a market with an HHI less than 0.2 (the more competitive markets) experienced, on average, a 7 percent increase in expenses. The corresponding increase during the same period for hospitals in markets with HHIs greater than 0.4 (less competitive markets) averaged 12 percent. Hence, looking at these two variables by themselves, it appears that hospitals in more competitive markets had expenses that tended to grow more slowly.

Table 1: Hospital Characteristics

Variable	*1982*	*1989*	*1997*
Number of hosptials	368	362	310
Operating expenses (millions $)	27.7	48.3	77.9
Total operating revenue (millions $)	28.2	48.0	78.3
Discharges	6,800	6,800	7,400
Visits	43,000	66,000	110,000
% Teaching	0.05	0.05	0.06
% Rural	0.14	0.14	0.15
% Bed < 100	0.36	0.33	0.25
% Bed 100 - 249	0.41	0.42	0.45
% Bed 250 - 399	0.15	0.15	0.20
% Bed 400+	0.08	0.09	0.08
% For-profit	0.28	0.30	0.26
% Not-for-profit	0.66	0.64	0.69
% Government	0.06	0.06	0.05

Table 2: Growth Rates in Expenses for Hospitals in High, Medium, and Low Competition Categories

Years	*HHI < 0.2*	*0.2 ≤ HHI < 0.4*	*0.4 < HHI*
1982–1986	0.21	0.40	0.41
1986–1990	0.35	0.51	0.54
1990–1994	0.17	0.24	0.30
1994–1997	0.07	0.11	0.12

When we controlled for additional variables in our regression analysis, we observed the same phenomenon. (The means and standard deviations of the covariates are in Table 3; the estimated coefficients from the regression models are in Tables 4 and 5.) We will focus our discussion on the policy-relevant variables. The coefficient of HHI, interacted with the year dummy variable, was significantly positive by 1984. This indicated that, as competition increased in the post-selective contracting period, more competitive hospitals had lower rates of cost growth relative to the 1980–1982 pre-selective contracting period. The rate of cost growth remained stable from 1984 until 1989 and then began to increase once again. This indicates that growth rates during the 1984–1989 period were the same across all HHI levels—it was not until after this period that the differential in growth rates appeared again.

The coefficient estimate for the Medicare pressure variable, which captured the cost-cutting pressure on hospitals exerted by the Medicare PPS, was significantly negative, and it continued to increase through 1997 with the exception of a leveling off period between 1990 and 1992. The negative coefficient for Medicare PPS indicates that costs grew at a slower rate as Medicare pressure increased. The percentage of MediCal discharges initially had no significant effect on operating expenses, but in the 1988–1991 period an increased proportion of MediCal discharges were associated with lower expenses. After 1991, the coefficients returned to statistical insignificance. In the post-selective contracting period, for-profit hospitals significantly lowered their costs and they maintained thereafter essentially the same rate of growth as not-for-profit hospitals. A further relative decrease for for-profit hospitals

Table 3: Means and Standard Deviations of Covariates in Multivariate Regression Model

Variables	*Mean*	*s.d.*
Total expenses	47.4	57.1
Net revenues	47.6	56.1
Total inpatient discharges	6,967.422	5,720.032
Total outpatient visits	67,128.8	82,826.83
Case mix index	1.258022	0.2908362
Medicare area wage index	1.202139	0.1279549
For-profit ownership	0.2824561	0.4502299
HHI*	0.3077875	0.1646883
Medicare pressure index	0.009937	0.0746901
Percent MediCal days	0.107533	0.1535422

*Hirshman-Herfindahl index.

Table 4: The Estimated Regression Model for Hospital Operating Revenue

Covariate	Operating Revenue	
	Coefficient	*t-statistic*
Constant	9.710	32.268
log(case mix index)	0.089	0.737
log(discharges)	0.265	5.238
log(visits)	0.408	10.764
log(discharges) squared	0.072	24.643
log(visits) squared	0.022	8.393
log(case mix index)*log(discharges)	0.036	2.447
log(visits)*log(discharges)	−0.084	−15.430
log(MEDICARE WAGE INDEX)	−0.766	−2.322
log(MEDICARE WAGE INDEX) squared	1.173	5.667
log(visits)*log(MEDICARE WAGE INDEX)	−0.161	−5.072
log(discharges)*log(MEDICARE WAGE INDEX)	0.256	6.389
1981 dummy	0.161	18.485
1982 dummy	0.309	35.465
1983 dummy	0.398	20.803
1984 dummy	0.468	23.662
1985 dummy	0.537	26.858
1986 dummy	0.635	30.345
1987 dummy	0.699	33.501
1988 dummy	0.778	38.345
1989 dummy	0.863	42.531
1990 dummy	0.955	46.281
1991 dummy	1.066	50.000
1992 dummy	1.150	52.791
1993 dummy	1.188	54.813
1994 dummy	1.217	54.863
1995 dummy	1.265	56.133
1996 dummy	1.292	56.520
1997 dummy	1.305	56.388
For-profit × 1983	0.029	1.668
For-profit × 1984	0.041	2.481
For-profit × 1985	0.036	2.141
For-profit × 1986	0.016	0.943
For-profit × 1987	0.025	1.489
For-profit × 1988	0.009	0.501
For-profit × 1989	−0.000	−0.016
For-profit × 1990	0.009	0.521
For-profit × 1991	−0.007	−0.402
For-profit × 1992	−0.014	−0.777
For-profit × 1993	−0.049	−2.767
For-profit × 1994	−0.020	−1.094
For-profit × 1995	−0.045	−2.552
For-profit × 1996	−0.030	−1.709
For-profit × 1997	−0.042	−2.359

Continued

Table 4: Continued

Covariate	*Operating Revenue*	
	Coefficient	t-*statistic*
Medicare pressure index*1984	−0.208	−2.207
Medicare pressure index*1985	−0.201	−2.114
Medicare pressure index*1986	−0.230	−2.433
Medicare pressure index*1987	−0.387	−4.099
Medicare pressure index*1988	−0.551	−5.852
Medicare pressure index*1989	−0.566	−5.956
Medicare pressure index*1990	−0.512	−4.871
Medicare pressure index*1991	−0.368	−3.496
Medicare pressure index*1992	−0.432	−4.012
Medicare pressure index*1993	−0.495	−4.591
Medicare pressure index*1994	−0.542	−4.902
Medicare pressure index*1995	−0.501	−4.509
Medicare pressure index*1996	−0.592	−5.312
Medicare pressure index*1997	−0.721	−6.299
% MediCal days*1983	−0.166	−2.414
% MediCal days*1984	−0.242	−3.505
% MediCal days*1985	−0.240	−3.670
% MediCal days*1986	−0.322	−5.441
% MediCal days*1987	−0.374	−6.745
% MediCal days*1988	−0.352	−6.828
% MediCal days*1989	−0.313	−6.333
% MediCal days*1990	−0.275	−6.199
% MediCal days*1991	−0.267	−6.393
% MediCal days*1992	0.140	3.322
% MediCal days*1993	0.159	3.951
% MediCal days*1994	0.099	2.452
% MediCal days*1995	0.059	1.481
% MediCal days*1996	0.154	3.814
% MediCal days*1997	0.187	4.555
log(Market HHI)*1983†	0.001	0.063
log(Market HHI)*1984	0.009	0.626
log(Market HHI)*1985	0.007	0.484
log(Market HHI)*1986	0.025	1.634
log(Market HHI)*1987	0.038	2.450
log(Market HHI)*1988	0.039	2.563
log(Market HHI)*1989	0.041	2.614
log(Market HHI)*1990	0.061	3.875
log(Market HHI)*1991	0.087	5.283
log(Market HHI)*1992	0.145	8.631
log(Market HHI)*1993	0.156	9.183
log(Market HHI)*1994	0.166	9.583
log(Market HHI)*1995	0.193	10.930
log(Market HHI)*1996	0.226	12.728
log(Market HHI)*1997	0.222	12.387
R-squared	0.92	

†HHI = Hirshman-Herfindahl index.

may have occurred during the 1996–1997 period, but this could simply be a momentary fluctuation.

Table 5 contains the regression coefficients for our multivariate model of hospital operating revenues. The HHI did not become significantly positive until 1987—three years after the HHI became significantly positive for the expenses model. This lag indicated that the revenue effects on more competitive hospitals started in 1987. The coefficients of HHI interacted with year dummies continued to increase steadily in magnitude until 1996 (1996 and 1997 HHI coefficients are almost identical).

The Medicare pressure variable was also negative and significant in the revenue model. By 1984, this variable decreased, and it did not stabilize until the mid-1990s. Yet in 1996 and 1997 the variable started to fall once again. Hospitals with a higher percentage of MediCal discharges had significantly reduced revenues in 1983–1991, but after 1991 the direction of this variable reversed and became positive. Additionally, in this model we observed that for-profit hospitals initially had significantly higher revenues; by 1986 they had revenues that were indistinguishable from the revenues of not-for-profits. This pattern continued until 1993, when the revenues of for-profit hospitals became significantly lower than those of not-for-profit hospitals.

In order to determine the impact of these lower rates of cost growth, we predicted the difference in growth rates for hospitals in markets with various levels of competition. Table 6 displays the difference between the revenue growth rates for hospitals operating in markets one standard deviation above the mean HHI (HHI = 0.47) and those hospitals in markets one standard deviation below the mean HHI (HHI = 0.17). As Table 6 demonstrates, competition had a negligible effect on revenue growth rates in 1983, the year after the selective contracting legislation was passed. However, by 1997 hospitals operating in markets one standard deviation below the mean HHI—the more competitive areas—had experienced an increase in revenues that was 20 percent lower than if these hospitals were located in an area with HHIs one standard deviation above the mean.

CONCLUSIONS

Our study confirms that increased hospital competition did, in fact, reduce the rate of growth in hospital costs over a significantly longer time period than had been demonstrated in previous studies. Indeed, we found that continuing reductions in the rate of growth in hospital costs occurred and could be

Table 5: The Estimated Regression Model for Hospital Operating Expenses

Covariate	*Operating Expenses*	
	Coefficient	t-*statistic*
Constant	12.289	44.560
log(case mix index)	−0.278	−2.456
log(discharges)	−0.106	−2.209
log(visits)	0.269	7.618
log(discharges) squared	0.068	23.518
log(visits) squared	0.014	5.629
log(case mix index)*log(discharges)	0.079	5.728
log(visits)*log(discharges)	−0.049	−9.650
log(MEDICARE WAGE INDEX)	0.021	0.067
log(MEDICARE WAGE INDEX) squared	1.396	7.123
log(visits)*log(MEDICARE WAGE INDEX)	−0.177	−5.909
log(discharges)*log(MEDICARE WAGE INDEX)	0.180	4.731
1981 dummy	0.166	20.218
1982 dummy	0.310	37.587
1983 dummy	0.392	21.555
1984 dummy	0.473	25.262
1985 dummy	0.545	28.925
1986 dummy	0.635	32.105
1987 dummy	0.717	36.273
1988 dummy	0.781	40.585
1989 dummy	0.878	45.719
1990 dummy	0.952	48.740
1991 dummy	1.078	53.466
1992 dummy	1.160	56.285
1993 dummy	1.210	58.713
1994 dummy	1.242	59.262
1995 dummy	1.281	60.134
1996 dummy	1.309	60.670
1997 dummy	1.327	60.650
For-profit × 1983	−0.002	−0.128
For-profit × 1984	−0.021	−1.320
For-profit × 1985	−0.045	−2.884
For-profit × 1986	−0.061	−3.891
For-profit × 1987	−0.043	−2.697
For-profit × 1988	−0.052	−3.232
For-profit × 1989	−0.045	−2.798
For-profit × 1990	−0.036	−2.203
For-profit × 1991	−0.034	−2.062
For-profit × 1992	−0.018	−1.065
For-profit × 1993	−0.036	−2.160
For-profit × 1994	−0.034	−1.982
For-profit × 1995	−0.061	−3.687
For-profit × 1996	−0.064	−3.800
For-profit × 1997	−0.031	−1.879

Continued

Table 5: Continued

Covariate	Operating Expenses	
	Coefficient	*t-statistic*
Medicare pressure index*1984	−0.020	−0.221
Medicare pressure index*1985	−0.122	−1.355
Medicare pressure index*1986	−0.176	−1.958
Medicare pressure index*1987	−0.260	−2.899
Medicare pressure index*1988	−0.488	−5.470
Medicare pressure index*1989	−0.419	−4.659
Medicare pressure index*1990	−0.601	−6.030
Medicare pressure index*1991	−0.551	−5.518
Medicare pressure index*1992	−0.595	−5.813
Medicare pressure index*1993	−0.668	−6.482
Medicare pressure index*1994	−0.699	−6.815
Medicare pressure index*1995	−0.710	−6.741
Medicare pressure index*1996	−0.720	−6.822
Medicare pressure index*1997	−0.843	−7.755
% MediCal days*1983	−0.024	−0.367
% MediCal days*1984	−0.041	−0.627
% MediCal days*1985	−0.007	−0.115
% MediCal days*1986	−0.57	−1.027
% MediCal days*1987	−0.091	−1.726
% MediCal days*1988	−0.153	−3.107
% MediCal days*1989	−0.137	−2.945
% MediCal days*1990	−0.140	−3.330
% MediCal days*1991	−0.087	−2.136
% MediCal days*1992	−0.001	−0.019
% MediCal days*1993	−0.038	−0.984
% MediCal days*1994	0.021	0.549
% MediCal days*1995	0.033	0.885
% MediCal days*1996	0.023	0.601
% MediCal days*1997	0.055	1.414
log(Market HHI)*1983†	0.003	0.212
log(Market HHI)*1984	0.041	2.904
log(Market HHI)*1985	0.038	2.666
log(Market HHI)*1986	0.045	3.081
log(Market HHI)*1987	0.052	3.560
log(Market HHI)*1988	0.034	2.390
log(Market HHI)*1989	0.048	3.266
log(Market HHI)*1990	0.045	3.036
log(Market HHI)*1991	0.089	5.738
log(Market HHI)*1992	0.121	7.621
log(Market HHI)*1993	0.136	8.418
log(Market HHI)*1994	0.158	9.604
log(Market HHI)*1995	0.181	10.843
log(Market HHI)*1996	0.195	11.693
log(Market HHI)*1997	0.199	11.695
R-squared	0.90	

†HHI = Hirshman-Herfindahl index.

Table 6: The Difference in Growth Rates Relative to the 1980–1982 Base Period (Hospitals with HHI > .14 − Hospitals with HHI < .47)

Year	*Expenses*	*Revenue*
1983	−0.0036	−0.0012
1984	−0.047	−0.011
1985	−0.0434	−0.0084
1986	−0.0513	−0.0293
1987	−0.0587	−0.0437
1988	−0.0393	−0.045
1989	−0.0545	−0.047
1990	−0.0513	−0.068
1991	−0.0955	−0.0937
1992	−0.1244	−0.1444
1993	−0.1370	−0.153
1994	−0.1546	−0.161
1995	−0.1717	−0.1802
1996	−0.1816	−0.2019
1997	−0.1843	−0.1994

Note: HHI = Hirshman-Herfindahl index.

attributed to competition. However, the large changes in costs occurred discontinuously: the rate initially fell in 1984 and continued to fall until 1989. Between 1989 and 1996, however, the expenses of highly competitive hospitals grew at a slower rate than did expenses in low-competition areas. It is still too early to determine whether the stability in the 1996–1997 period marks the end of cost reductions or if this is just a temporary stabilization.

Another novel feature of this article is our study of the effects of competition on revenues as well. Our revenue model indicated that competition has slowed the growth rate of revenues in addition to the growth rate of hospital costs. Yet the pattern for revenues differs from the pattern for costs. Competition did not affect revenues significantly until after 1986, and then revenues had a steadier pattern of decline than costs even though the reduction in revenues accelerated in 1992. There appears to be a continuing erosion of hospital revenues through 1997, a pattern that suggests an initial reduction in costs by hospitals in anticipation of reduced revenues. The continued revenue reductions through 1997 suggest that hospitals will likely be forced to continue cutting their costs.

Our observation that Medicare pressure had parallel effects on revenue and costs suggests that hospitals reacted to their revenue expectations in the coming year once the Medicare budget had been passed and was definite. Each year, hospitals appear to have adjusted their short-term expectations

based on the Medicare budget. Hospitals do not appear to have based cost-cutting behavior on long-term expectations. This is demonstrated by the estimated coefficients of the Medicare pressure variable, which peaked in 1991 and then began growing again in 1997—possibly in anticipation of further cuts from the Balanced Budget Act.

Medicaid pressure seems to have had a temporary effect on costs through the 1980s and to have disappeared after 1991, the same year in which there was a reversal of the effect of MediCal on revenues. Both of these patterns could be related to the rapid growth of Disproportionate Share Payments after 1991 that partially compensated for low Medicaid reimbursement rates.

For-profit hospitals' costs fell relative to those of the not-for-profits after 1983, and they continued to stay below the not-for-profits' costs. The differential between for-profit hospital costs and not-for-profit hospital costs tended to grow over the study period. Revenues for not-for-profit hospitals versus for-profit hospitals had a different pattern. In the early post-selective contracting period, for-profit hospitals had higher revenues; this confirmed previous results that indicated that for-profit hospitals tended to have more aggressive pricing strategies and therefore that they generated more revenue (Pattison and Katz 1983). The difference between for-profit and not-for-profit hospital revenues disappeared in 1986 (the same year that selective contracting started to have an overall statistically significant effect on revenues). Most recently, it appears that for-profit hospitals have lowered prices even further. In other words, it appears that for-profit hospitals have adjusted to the new competitive era by cutting costs more aggressively and then setting lower prices.

POLICY IMPLICATIONS

The introduction of price competition was intended to create cost discipline in the health care system. Judging by the results of this study, these objectives appear to have largely been accomplished during the period observed. Previous studies had shown that hospitals in more competitive markets tended to have had higher costs in the period preceding selective contracting (Zwanziger and Melnick 1988; Zwanziger et al. 1994b, Melnick and Zwanziger 1995). The latter paper found a 14 percent difference in revenue between high- and low-competition hospitals during the base period. Our study suggests that, all else equal, revenues are now lower in more competitive markets. However, it is unclear whether or not these continued revenue reductions will be entirely positive.

Although decreasing revenues to remove previous inefficiencies is certainly positive, reducing revenues beyond this point could lead to an erosion in the quality of care. It is likely that during the base period hospitals in more competitive markets were somewhat inefficient, given the fact that, all else equal, their costs were higher (Zwanziger et al. 1994b). Whether or not the entire differential was "fat" is unclear. It is likely that such cost cutting cannot continue indefinitely without reducing the quality of care provided to patients. Of particular concern is the combined effect of selective contracting and changes in Medicare and Medicaid reimbursement. Because hospitals often base their cost-cutting practices on expected decreases in revenue, the passage of the Balanced Budget Act of 1997 may lead hospitals to further reduce their cost structures. The fact that revenue reduction has continued since 1986 and that additional decreases in Medicare funding are expected leads to two important areas for future research: the effects of such sustained cost reductions (1) on the quality of care and (2) on the diffusion of medical technology.

From our analysis, it is clear that antitrust laws are required to protect the competitiveness of hospital markets and to maintain the effectiveness of managed care in reducing costs. Our results imply that it is not just selective contracting—but selective contracting in conjunction with vigorous competition—that is important in obtaining cost containment.

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